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Due Date: April 13, 2004IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Lawrence Yium-chee Chiu et al. Examiner: Kimberly N. McLean  
Serial No.: 09/755,858 Group Art Unit: 2187  
Filed: January 5, 2001 Docket: ARC9-00-054US1 (MCM)  
Title: METHOD AND APPARATUS FOR SUPPORTING PARITY PROTECTION IN A RAID  
CLUSTERED ENVIRONMENT

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on April 13, 2004.By:   
Name: Jason S. FeldmarCommissioner for Patents  
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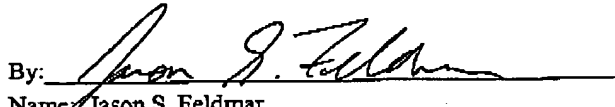
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FROM: Jason S. Feldmar  
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Applicants:	Lawrence Yium-chee Chiu et al.
Serial No.:	09/755,858
Filed:	January 5, 2001
Group Art Unit:	2187
Our Ref. No.:	ARC9-00-054US1 (MCM)

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Due Date: April 13, 2004

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**  
**BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

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APR 13 2004

In re Application of: )

Inventor: Lawrence Yium-chee Chiu et al. )

Examiner: Kimberly N. McLean )

Serial #: 09/755,858 )

Group Art Unit: 2187 )

Filed: January 5, 2001 )

Appeal No.: \_\_\_\_\_ )

Title: METHOD AND APPARATUS FOR )  
SUPPORTING PARITY PROTECTION IN )  
A RAID CLUSTERED ENVIRONMENT )

**OFFICIAL****BRIEF OF APPELLANTS****MAIL STOP APPEAL BRIEF - PATENTS**

Commissioner for Patents  
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Alexandria, VA 22313-1450

Dear Sir:

In accordance with 37 CFR §1.192, Appellants hereby submit the Appellants' Brief on Appeal from the final rejection in the above-identified application, in triplicate, as set forth in the Office Action dated November 14, 2003.

Please charge the amount of \$330 to cover the required fee for filing this Appeal Brief as set forth under 37 CFR §1.17(c) to Deposit Account No. 09-0441 of IBM Corporation, the assignee of the present application. Also, please charge any additional fees or credit any overpayments to Deposit Account No. 09-0441.

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I. REAL PARTY IN INTEREST

The real party in interest is IBM Corporation, the assignee of the present application.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences for the above-referenced patent application.

III. STATUS OF CLAIMS

Claims 5, 13, and 21 were canceled in an Office Action response filed on July 16, 2002.

Claims 1-4, 6-12, 14-20, and 22-24 remain in the application.

Claims 1, 4, 7, 9, 12, 15, 17, 20, and 21 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Menon et al. (U.S. Patent No. 5,574,882) in view of Abe (U.S. Patent No. 5,450,600).

Claims 6, 14, and 22 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Menon et al. in view of Abe and further in view of IBM Technical Disclosure Bulletin "Limited Distributed DASD Checksum".

Claims 8, 16, and 24 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Menon in view of Abe and further in view of Lyons (U.S. Patent No. 6,101,615).

Claims 2-3, 10-11, and 18-19 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Menon in view of Abe and further in view of Ofer (U.S. Patent No. 5,892,955).

All of the above rejections are appealed herein.

IV. STATUS OF AMENDMENTS

Subsequent to the final rejection, no claims have been cancelled, amended, or added.

V. SUMMARY OF THE INVENTION

Appellants' invention, as recited in independent claims 1, 9, and 17 are generally directed to updating parity data in a RAID clustered environment (see page 2, lines 11-12). Specifically, parity is locked (see page 9, lines 12-14 and line 22), read (see page 9, line 23-23), and new parity data is generated (see page 9, lines 23-24). The new parity data is written (see page 9, line 24) and then

unlocked (see page 10, line 1). Further, the commands for writing and unlocking the parity are combined into a single command (see page 10, lines 6-14). The combining of these commands into a single command provides for less overhead than other methods for any number of nodes in a cluster (see page 10, lines 6-7).

#### VI. ISSUES PRESENTED FOR REVIEW

Whether the Information Disclosure Statement filed on March 15, 2002 complied with 37 CFR 1.98(a)(2).

Whether claims 1, 4, 7, 9, 12, 15, 17, 20, and 21 are patentable under 35 U.S.C. 103(a) over Menon et al. (U.S. Patent No. 5,574,882) in view of Abe (U.S. Patent No. 5,450,600).

Whether claims 6, 14, and 22 are patentable under 35 U.S.C. 103(a) over Menon et al. in view of Abe and further in view of IBM Technical Disclosure Bulletin "Limited Distributed DASD Checksum".

Whether claims 8, 16, and 24 are patentable under 35 U.S.C. 103(a) over Menon in view of Abe and further in view of Lyons (U.S. Patent No. 6,101,615).

Whether claims 2-3, 10-11, and 18-19 are patentable under 35 U.S.C. 103(a) over Menon in view of Abe and further in view of Ofer (U.S. Patent No. 5,892,955).

#### VII. GROUPING OF CLAIMS

All of the claims stand or fall together.

#### VIII. ARGUMENTS

##### *A. The Information Disclosure Statement Filed on March 15, 2002 Complied with 37 CFR 1.98(a)(2)*

On March 15, 2002, a supplemental Information Disclosure Statement (IDS) (along with copies of all documents cited in the IDS) was filed with the U.S. Patent and Trademark Office. Acknowledgement of receipt of the supplemental IDS and references was received in the form of a post card stamped by the OIPE on March 21, 2002.

In the Office Action mailed on March 5, 2003, acknowledgement of the supplemental IDS was not received. Accordingly, in a response filed via facsimile on June 2, 2003, Appellants

submitted a copy of the return post card and the previously submitted 1449. Appellants further requested acknowledgement of the supplemental IDS by duly noting/initialing the Form 1449.

In the final Office Action mailed on November 14, 2003, the Examiner indicated that that IDS was filed on June 2, 2003 and that it failed to comply with 37 CFR 1.98(a)(2) because copies of the publications were not enclosed.

Appellants respectfully disagree with the Examiner. Firstly, the supplemental IDS was not filed on June 2, 2003. Instead, it was filed on March 14, 2002. An additional copy of the 1449 was filed on June 2, 2003 in an attempt to remind the Examiner to review the previously submitted references and note such a review on the 1449 form. Secondly, copies were provided when the IDS was filed on March 21, 2002. Nonetheless, if the Patent Office has lost the previously submitted copies, Appellants would be happy to provide additional copies upon request. Appellants assume that the PTO has maintained these copies since acknowledgement of receipt (via the return postcard) was received. Accordingly, Appellants request the Board to advise the Examiner to either (1) review the references and duly note the 1449 accordingly, or (2) request a copy of the references that have been lost due to Patent Office error.

*B. The Claims are Patentable Over the Cited References*

The final Office Action rejected the independent claims as follows:

Regarding claims 1, 4, 17, and 20, Menon discloses a method of updating parity data in a RAID clustered environment comprising locking parity data, without communicating with other nodes, for data managed in SCSI (small computer system interface) disks in a RAID clustered system (Figure 1; C4, L42; C4, L36; C 6, L 1-46), wherein locking prevents other nodes from modifying the parity (C 6, L 24-26); reading the parity data (C 6, L 27-28); generating new parity data by exclusive oring data from a first node and a second node (C 6, L 29-30); writing the parity data to a SCSI disk in the RAID system (C 6, L 31-44) and unlocking the parity wherein the unlocking and the writing steps are combined (C 6, L 31-44). Menon does not explicitly disclose combining the commands for writing and unlocking into a single command. However, Abe teaches the concept of combining commands {steps} (integrating basic commands into an integrated command) into a single command (integrated command - C 5, L 22-68; C 6, L 1-11). Abe teaches that this feature improves command operations by simplification (C 17, L 49-50). Hence, one of ordinary skill in the art would have recognized the benefits of Abe's teachings and would have been motivated to use these teachings with the teachings of Menon for the desirable purpose of simplification.

Menon merely describes a system and method that is used by software implemented Redundancy Array of Inexpensive Disk (RAID) arrays to achieve adequate performance and reliability, as well as to improve performance or low cost hardware Raids. However, as stated in the

Office Action, Menon fails to provide for combining the commands for writing and unlocking into a single command. To teach this claim element, the Office Action relies on Abe col. 5, line 22 – col. 6 line 11; and col. 17, lines 49-50.

Abe merely relates to the command operation to draw graphics by a graphics processing system (see col. 1, lines 9-10). Abe describes an integrated command definition file defining both names of integrated commands and basic commands integrated. A basic command syntax file stores the basic commands and the parameter information. An integrated command registration utility has functions to convert the integrated command definition to an integrated command syntax file. An interactive command management module recognizes both the basic commands memorized in the basic command syntax file and integrated commands memorized in the integrated command syntax file. (See Abstract)

However, Abe completely fails to teach, describe, or suggest: (1) a RAID clustered system; (2) a SCSI disk in a RAID system; (3) parity; (4) writing and unlocking parity data; and (5) combining a writing command and an unlocking command. In fact, separate electronic searches for the terms "RAID", "SCSI", "parity", "writ", "lock", and "combin" all came up with no results. Without even mentioning these vital claimed terms, Abe cannot possibly teach the invention (or the suggested element) as claimed. In this regard, Abe merely describes an "integrated command" that integrates a plurality of basic commands for drawing graphics in a graphic processing system (see col. 1, lines 9-10, and col. 5, line 22 – col. 6, line 11). Thus, Abe specifically relates to integrating graphics commands (and not parity as claimed) in a graphics processing system. The claims specifically provide for combining a parity writing and parity unlocking command into a single command. There is no suggestion, implicit or explicit, for such an integrated or combined command.

Appellants also submit that there is no suggestion to use Abe's teachings in a RAID clustered environment or to update parity data. Further, there is no suggestion/motivation to combine Menon with Abe. The Office Action provides that the motivation to combine Menon and Abe is based on recognizing Abe's benefits for the desirable purpose of simplification. The MPEP §2141.01(a) provides "In order to rely on a reference as a basis for rejection of an applicant's invention, the reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned" (In re

Oetiker, 977 F.2d 1443, 1446 (Fed. Cir. 1992). Additionally, in accordance with MPEP §2143, there must be a motivation to combine the references. In this regard, MPEP §2143.01 provides that there must be some teaching, suggestion, or motivation to combine either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art.

In the cited references, Menon's field of invention relates to data storage systems and a method for storing data in a software or low cost hardware implemented storage array system (see col. 1, lines 7-10). However, Abe's field of invention relates to a command operation for drawing graphics by a graphic processing system (see col. 1, lines 9-10). Such clearly unrelated fields are not even remotely similar. In this regard, a graphics programmer is not likely to consider and look to data storage systems and RAID environments (see col. 1, line 14 - col. 2, lines 44) for any solutions. Further, there is no suggestion to combine such references or fields of art, either implicitly or explicitly within the references. The knowledge generally available to one of ordinary skill in the art also fails to provide such a motivation. The Office Action relies on the motivation being a desirable purpose of simplification. The mere concept of a desire to simplify does not even remotely acknowledge the problem Menon (or the present invention) addresses. Also, such a concept fails to provide a motivation to combine the references.

The final Office Action responded to the above arguments stating:

Regarding Applicant's argument that Abe fails to teach (1) a RAID clustered system; (2) a SCSI disk in a RAID system; (3) parity; (4) writing and unlocking parity data; and (5) combining a writing command and an unlocking command, Abe was not relied upon for teaching these features. The rejection made above is a 35 USC 103(a) which indicates that all claimed features are not taught by a single prior art, otherwise a 35 USC 102 rejection would have been made. Accordingly, the primary reference, Menon, is relied upon for teaching (1) a RAID clustered system; (2) a SCSI disk in a RAID system; (3) parity; (4) writing and unlocking parity data. Menon discloses a write command and an unlocking command, however, Menon does not disclose combining these commands into a single command. Abe, the secondary reference, is relied upon solely for teaching the concept of combining commands into single commands. Thus the combined teachings of the prior art disclose the claimed invention.

Additionally, In response to applicant's arguments that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the

knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Abe teaches that combined commands provides simplification and improves commands operation and thus suggests the use of such concept for the purpose of simplification and improved command operation. Designs are implemented to meet certain goals and requirements and thus a system design requiring or desiring simplified command operation would be motivated to use teachings of Abe for such a purpose.

Appellants are aware of the differences between a 35 USC 102 rejection and a 35 USC 103(a) rejection. Appellants submitted the above arguments noting that Abe specifically related to integrating graphics commands in a graphics processing system (see col. 1, lines 9-10 [the Field of the Invention] and col. 5, line 22-col. 6, line 11). In this regard, the claims are specifically directed to combining a parity writing and parity unlocking command into a single command. The final Office Action asserts that Abe is merely used to teach the concept of combining commands into single commands. However, the claims are more specific than merely combining commands. Instead, the claims relate to combining parity commands and provides that the commands for writing and unlocking parity are combined into a single command. Abe merely talks about combining graphics commands and not parity commands. Utilizing the mere concept that it may be useful in graphics applications to combine commands and applying the concept to very specific parity commands in a wholly different environment is improper. In this regard, Appellants submit that a single computer programmer/developer is not knowledgeable in all fields of programming. Instead, a programmer/developer has a field of focus in a particular area.

To better understand the differences between Abe and the present invention, a discussion of the OSI (open system interconnection) network layer model is useful. The OSI model is a well-known prior art model that defines the framework for a network in seven different layers. Control is passed from one layer to the next in the hierarchy. Layer 7 is the "application layer" that supports application and end-user processes. Everything in this layer is application specific. Accordingly, graphics applications such as that described in Abe would fall into this layer. Layer 6 is the "presentation layer" and provides independence from differences in data representation (e.g., encryption) by translating from application to network format. The presentation layer transforms data into the form that the application layer can accept. Layer 5 is the "session layer" that establishes, manages, and terminates connections between applications. Layer 4 is the "transport layer" that provides for the transparent transfer of data between end systems, or hosts, and is

responsible for end-to-end error recovery and flow control. Layer 3 is the "network layer" and provides switching and routing technologies, creating logical paths for transmitting data from node to node. Layer 2 is the "data link layer" at which data packets are encoded and decoded into bits. The data link layer furnishes transmission protocol knowledge and management and handles errors in the physical layer, flow control, and frame synchronization. Layer 1 is the "physical layer" that conveys the bit stream (electrical impulse, light or radio signal) through the network at the electrical and mechanical level.

In view of the above, it is apparent that the parity commands of the present invention (which are used to verify data on a RAID system) likely fall within either the transport, network, or data link layer. Such a layer is significantly distinguishable from commands issued at the application layer. Appellants submit that someone skilled in the art at the application layer has an expertise with a particular application. In the present situation, Abe has experience with graphics processing applications and drawing circles or shapes on a display. Such skills are considerably different and distinguishable from the present invention which involves parity and commands at a much lower layer. In this regard, an expert in programming a graphics application may not have any knowledge with respect to the details regarding how and where the graphics file is stored. Instead, such a graphics programmer merely saves a drawing without any knowledge of whether it is stored on a RAID system, a network, or the detailed commands useful for locking/unlocking the data at a particular location.

The Office Action asserted that there is a motivation to combine because Abe teaches that combined commands provides simplification and improves command operation and thus suggests the use of such concept for the purpose of simplification and improved command operation. In this regard, the Office Action cites col. 17, lines 49-50. The cited portion is within a list of features and advantages of an integrated command. The portion immediately following the cited portion further describes the simplification - col. 17, lines 49-55 provides:

(2) The command operation is improved by simplification.  
The operator does not need to indicate menus to select the next command when he continuously execute a similar function by the command system. The operator can continue the operation without selecting other commands from the menus.

In view of the above, it is clear, that the advantage is provided to an interactive user that is operating in a graphics program and can perform multiple combined commands at once. Such an advantage may be great in the graphics programming environment. However, there is no operator interactively working in a RAID system when saving parity. In this regard, it is commonly known that parity data is not stored and used by a user interactively. Instead, as claimed, it is performed in a RAID clustered environment between nodes by the system and not by an interactive user selecting menus and issuing command interactively (as in Abe). Thus, the advantage of simplifying life for an interactive user in a graphics environment would not apply to the present invention.

In addition to the above, Appellants submit that the present invention provides advantages not acknowledged or suggested at all. For example, the overhead for a cluster with three or more nodes may be significantly reduced (see page 10, lines 4-5 of the specification). In this regard, the overhead is reduced by decreasing the number of commands that are sent.

Also, under MPEP 2145, a prior art reference is analogous if the reference is in the field of applicant's endeavor or, if not, the reference is reasonably pertinent to the particular problem with which the inventor was concerned. *In re Oetiker*, 977 F.2d 1443, 1446, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992). Appellants submit that Abe is not in the field of Appellant's endeavor nor is Abe reasonably pertinent to the particular problem with which the inventor was concerned.

In view of the above, Appellants submit that Abe completely fails to teach the combining of commands for writing parity and unlocking parity into a single command. Further, Abe cannot be combined with Menon because Abe is used in a graphics program while Menon is used in a RAID system. In this regard, there is no/limited overlap between graphics programs and RAID system commands.

Appellants also disagree with the assertion in the Office Action that there would be a motivation to combine. There is no reason or motivation in Abe that provides for combining commands at any layer other than the application layer. Further, Abe's teaching of combined commands does not even refer to or allege the combination of any parity commands whatsoever. Similarly, Menon fails to provide or suggest any of the advantages obtained by the invention or the use of the invention in a graphics environment.

Nonetheless, even if Menon is combined with Abe, the combination would fail to teach the invention as claimed. For example, the combination of Menon with Abe would teach combining drawing commands in accordance with Abe and then storing the drawings in a RAID environment with appropriate parity. However, the concept of combining a write and unlock parity command as claimed is not even remotely suggested by the references, either separately, or in combination.

In response to the failure to teach argument, the final Office Action provides:

Regarding Applicant's argument that the combined references teach away from the claimed invention, it appears that the Applicant is making such an argument on the basis of structurally incorporating one reference into another. However, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Appellants submit that the argument is not on the basis of structurally incorporating one reference into another. Instead, Appellants simply submit that even if the references are combined, the combination still fails to teach the invention as claimed as suggested in the final Office Action. MPEP 2142 states: "Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)." The combination of Abe and Menon fails to teach all of the claim limitations. Specifically, the combination fails to teach the combination of specific parity commands as claimed.

Further, under MPEP 2141.01, in determining the differences between the prior art and the claims, the question under 35 U.S.C. 103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious. *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 218 USPQ 871 (Fed. Cir. 1983); *Schenck v. Nortron Corp.*, 713 F.2d 782, 218 USPQ 698 (Fed. Cir. 1983). Accordingly, the claimed invention as a whole must be considered. In this regard, the combination of Abe and Menon fails to teach the invention as a whole. For example, as described above, the combination fails to teach the combination of a write parity command and an unlock parity command into a single command.

Claim 4 further provides for combining the locking and reading steps. All of the rationale set forth above applies equally to this claim. Additionally, the claim adds a further limitation with

the combination of additional parity commands. The provisions for two different command combinations as set forth in independent claim 1 and dependent claim 4 is also nonobvious in view of both Abe and Menon.

The arguments above apply similarly to the remaining claims.

IX. Conclusion

In light of the above arguments, Appellants respectfully submit that the cited references do not anticipate nor render obvious the claimed invention. More specifically, Appellants' claims recite novel physical features which patentably distinguish over any and all references under 35 U.S.C. §§ 102 and 103. As a result, a decision by the Board of Patent Appeals and Interferences reversing the Examiner and directing allowance of the pending claims in the subject application is respectfully solicited.

Respectfully submitted,

GATES & COOPER LLP

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G&C 30879.80-US-01

## APPENDIX

1. A method of updating parity data in a redundant array of independent disk (RAID) clustered environment comprising:

(a) locking parity data, without communicating with other nodes, for data managed in SCSI (small computer systems interface) disks in a RAID clustered system, wherein the locking prevents other nodes from modifying the parity data;

(b) reading the parity data;

(c) generating new parity data by exclusive oring data from a first node and a second node;

(d) writing the parity data to a SCSI disk in the RAID clustered system; and

(e) unlocking the parity data, wherein commands for writing and unlocking are combined into a single command.

2. The method of claim 1, wherein the locking comprises issuing a RESERVE command.

3. The method of claim 1, wherein the unlocking comprises issuing a RELEASE command.

4. The method of claim 1, wherein the locking and reading steps are combined.

5. (CANCELED)

6. The method of claim 1 wherein the RAID clustered system is RAID-4.

7. The method of claim 1 wherein the RAID clustered system is RAID-5.
8. The method of claim 1 wherein the RAID clustered system is RAID-6.
9. An apparatus for updating parity data in a redundant array of independent disk (RAID) clustered environment comprising:
  - (a) a plurality of SCSI (small computer systems interface) storage devices organized in a RAID clustered system;
  - (b) data stored in the plurality of SCSI storage devices;
  - (c) a first node, operatively coupled to the plurality of SCSI storage devices, that manages storage and retrieval of the data in the plurality of SCSI storage devices, wherein the first node is configured to:
    - (i) lock parity data without communicating with other nodes, wherein a lock prevents other nodes from modifying the parity data;
    - (ii) read the parity data;
    - (iii) generate new parity data by exclusive oring data from two nodes;
    - (iv) write the parity data to a SCSI disk in the RAID clustered system; and
    - (v) unlock the parity data, wherein logic for writing and unlocking are combined into a single command.
10. The apparatus of claim 9, wherein the first node locks the parity data by issuing a RESERVE command.

11. The apparatus of claim 9, wherein the first node unlocks the parity data by issuing a RELEASE command.

12. The apparatus of claim 9, wherein the first node is further configured to combine logic for locking and reading.

13. (CANCELED)

14. The apparatus of claim 9 wherein the RAID clustered system is RAID-4.

15. The apparatus of claim 9 wherein the RAID clustered system is RAID-5.

16. The apparatus of claim 9 wherein the RAID clustered system is RAID-6.

17. An article of manufacture, embodying logic to perform method steps of updating parity data in a redundant array of independent disk (RAID) clustered environment, the method steps comprising the steps of:

- (a) locking parity data without communicating with other nodes, wherein the locking prevents other nodes from modifying the parity data;
- (b) reading the parity data;
- (c) generating new parity data by exclusive oring data from two nodes;
- (d) writing the parity data to a SCSI (small computer systems interface) disk in the RAID clustered system; and

(e) unlocking the parity data, wherein commands for writing and unlocking are combined into a single command.

18. The article of manufacture of claim 17, wherein the locking comprises issuing a RESERVE command.

19. The article of manufacture of claim 17, wherein the unlocking comprises issuing a RELEASE command.

20. The article of manufacture of claim 17, wherein the locking and reading steps are combined.

21. (CANCELED)

22. The article of manufacture of claim 17 wherein the RAID clustered system is RAID-4.

23. The article of manufacture of claim 17 wherein the RAID clustered system is RAID-5.

24. The article of manufacture of claim 17 wherein the RAID clustered system is RAID-6.